RIB UPDATE

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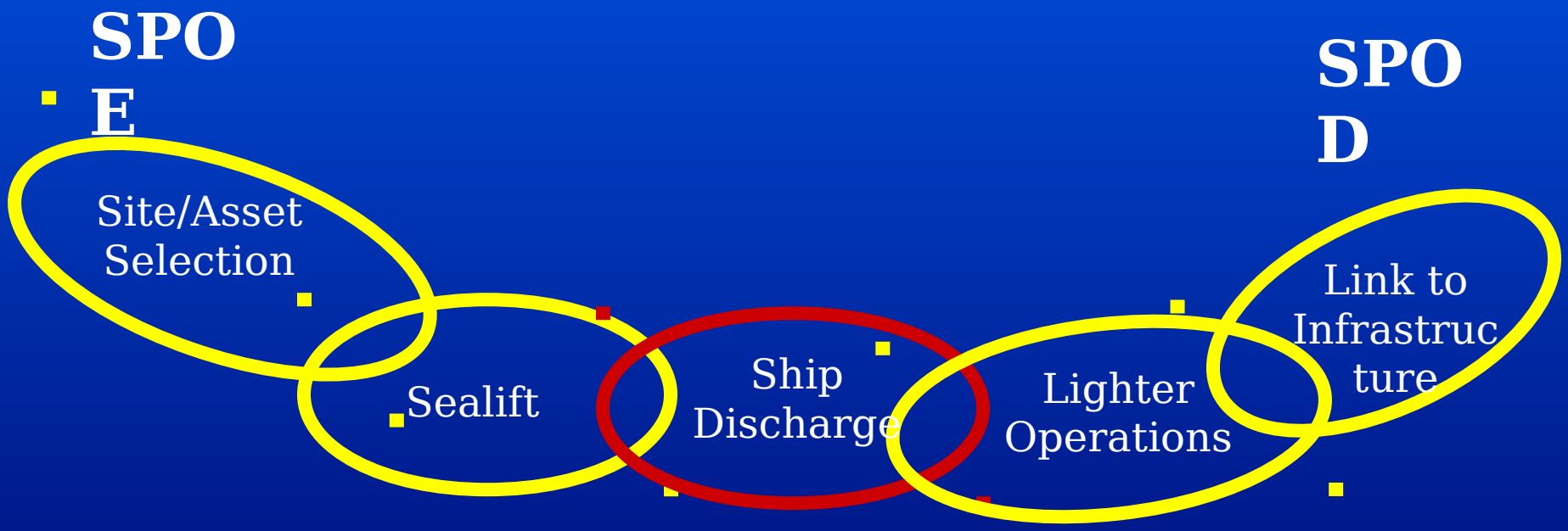
JLOTS Chain of Operations



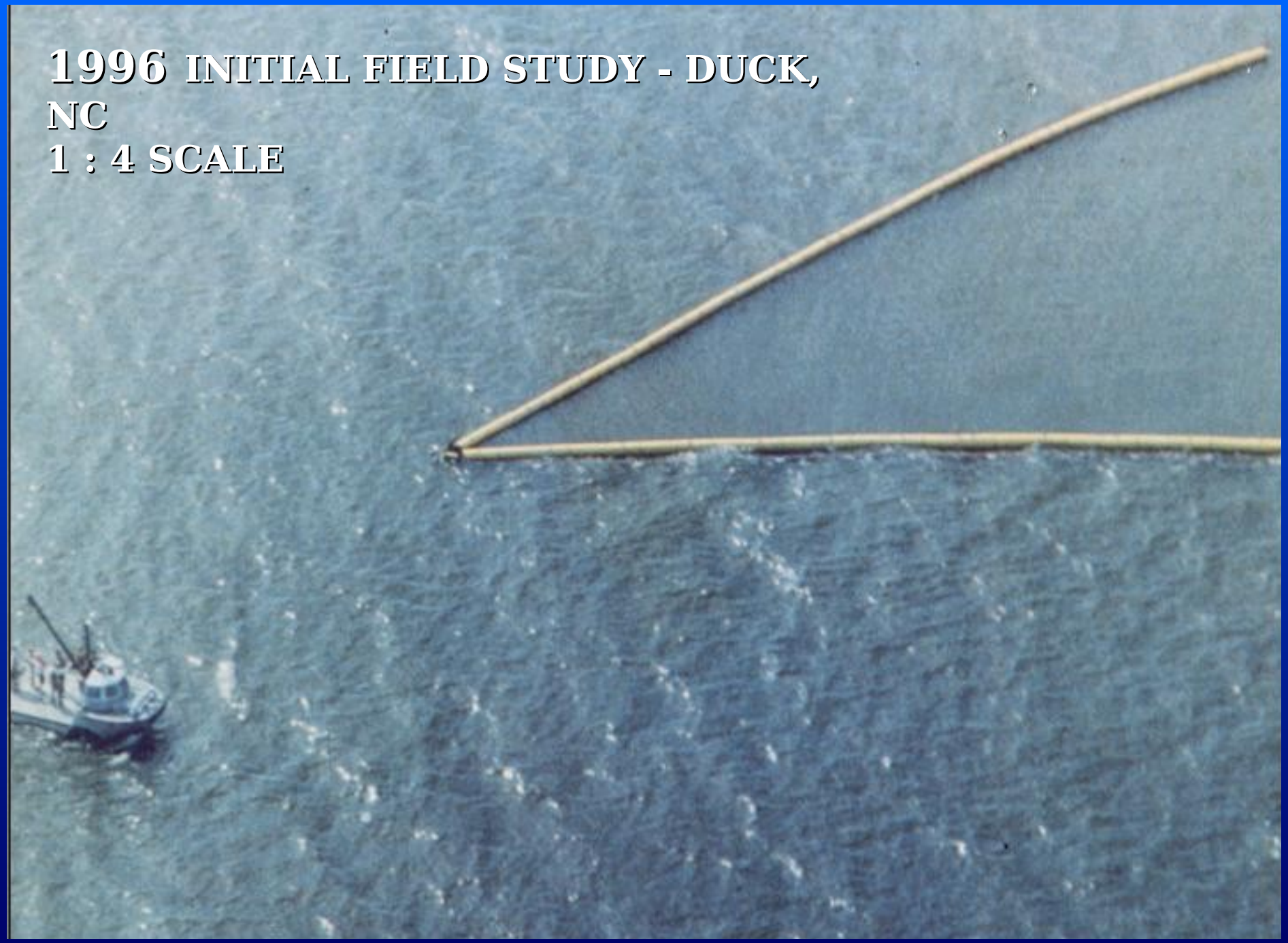
POTENTIAL ROLE OF THE RIBS IN JLOTS OFFSHORE SHIP DISCHARGE

Operation	Problems	RIBS	Other Systems
LO/LO	Crane pendulation produced by ship roll	Controls ship heading by RIB mooring system	SS3 Crane Heading control Improved tag line system
	Relative motions between ship and lighters	Lowers sea state	Platform Motion Compensation
	Fendering/mooring ships and lighters	Lowers sea state	Improved fendering
FLO/FLO	Ship/cargo motions during flooding/ recovery	Lowers sea state	None
RO/RO	Motions of RRDF	Lowers sea state	None
	Ramp motions caused by ship roll	Controls ship heading by RIB mooring system	Heading control system
OPDS	SALM launch in SS2	Lowers sea state	Improved mooring systems

Military Operational Requirements for RIB

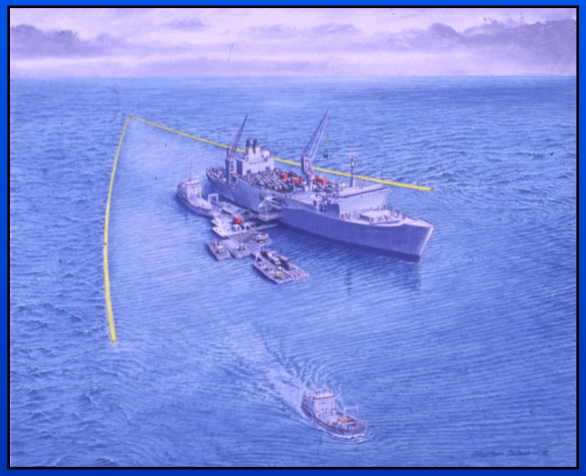
- Rapid Employment
- Arrive with HLPS
- SS3 reduced to SS2
- SS5 Survivable
- SS3 Employment Capability

***** ORD approved 17 Jan 2000 ******


1996 INITIAL FIELD STUDY - DUCK, NC
1 : 4 SCALE

Approved by ASTWG, AUG 98

Enhanced Coastal Trafficability And Sea State Mitigation



DTO MP.28.01

Advanced Technology Demonstration

START DATE: FY99

USAE Research & Development Center
Waterways Experiment Station
Coastal and Hydraulics Laboratory
Geotechnical Laboratory

ATD Exit Criteria

Exit Criteria – Enhanced Coastal Trafficability and Sea Stat		
Part I: Rapidly Installed Breakwater System (RIBS)		
Description	**Threshold**	**Goal**
Setup and Employment of RIBS after Arrival Onsite	48 Hours	24 Hours
Demonstrated RIBS Performance in Wave Height Reduction	50%	65%
Survivability of RIBS in Storms	Sea State 5	Sea State 6
Transportable and Employable Using Existing Assets	TBD	TBD
Part II: Cross-Beach		
Description	**Threshold**	**Goal**
Demonstrated Improvement in Construction Time over Existing Systems	30%	50%
Demonstrated Performance in Terms of Throughput and Maintenance Relative to Sand Grid Roadways	Equal	20% Better
Transportable and Employable Using Existing Assets	N/A	N/A

ATD MILESTONES

- ***FY 99 Structural Requirements for RIBS***
- ***FY 00 Mooring Requirements for RIBS***
- ***FY 00 Engineering Design for Prototype RIBS***
- ***FY 01 Fabricate 1st Prototype ATD-RIBS***
- ***FY 01 Field Deploy 1st Prototype ATD-RIBS***
- ***FY 01 Plan and Materials for Beach Stabilization***
- ***FY 02 Incorporate Lessons Learned in Final Design***
- ***FY 02 Fabricate Final Prototype ATD-RIBS***
- ***FY 02 Deploy Final Prototype ATD-RIBS w/ Exercise***
- ***FY 02 Demonstrate Beach Stabilization w/ Exercise***

All Milestones have been met or on schedule and within budget

RIBS XM-99 Field Study

- 1 : 1 “Ocean Scale” XM-RIBS
  - Segmented-type designed for ship deployment
  - 255 ft legs. 8 ft beam, 24 ft draft
- Launch date: May 20, 1999
- Recovery date: 4 June 1999
- Location: Cape Canaveral, FL
- Instrumentation and Monitoring:
  - mooring line load cells
  - structural steel strain gages
  - current meters
  - wave gages
  - DGPS
- Fixed and flexible joints

Nose Pin at Bow

Stern Section, Port Leg

- **RIBS XM-99 (5/20/99)**
  - **Hsig = 2.1 ft, Severe angle of approach**

- **RIBS XM-99 (5/21/99)**
  - **Hsig = 2.5 ft, Anticipated angle of approach**

Lessons Learned

- Structure must be constructed of flexible materials (bends but doesn’t break)
- Moving parts (connections) must be minimized
- Theoretical Performance Equations were validated by field results
- Performance of RIBS during off angle wave approach was better than expected
- Mooring performed well

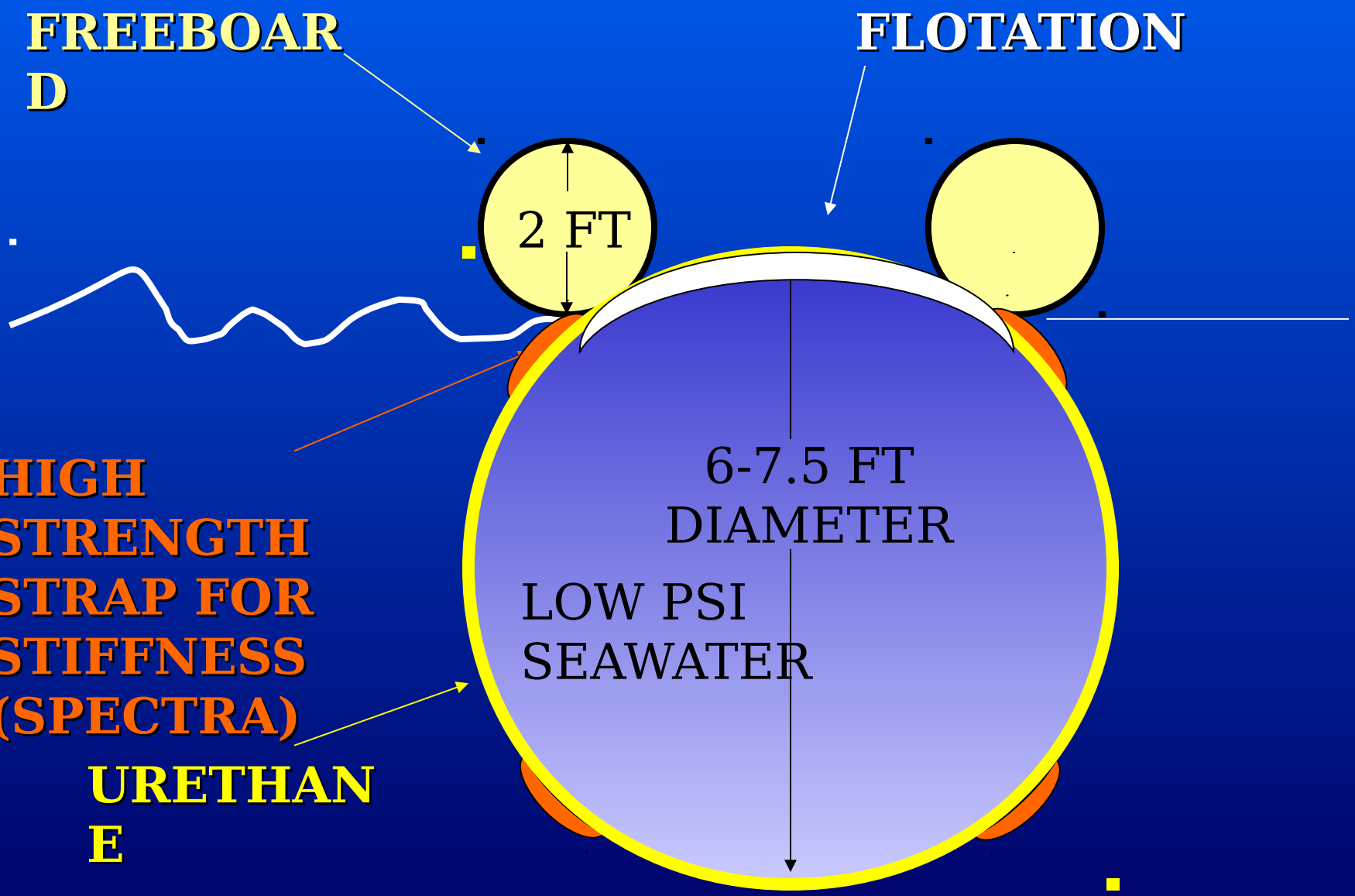
HYDROBEAM RIBS

- SURVIVABILITY
- PORTABILITY (COULD BE TRUCKED)
- INTERCHANGEABLE MODULES TO MAKE UP EACH LEG

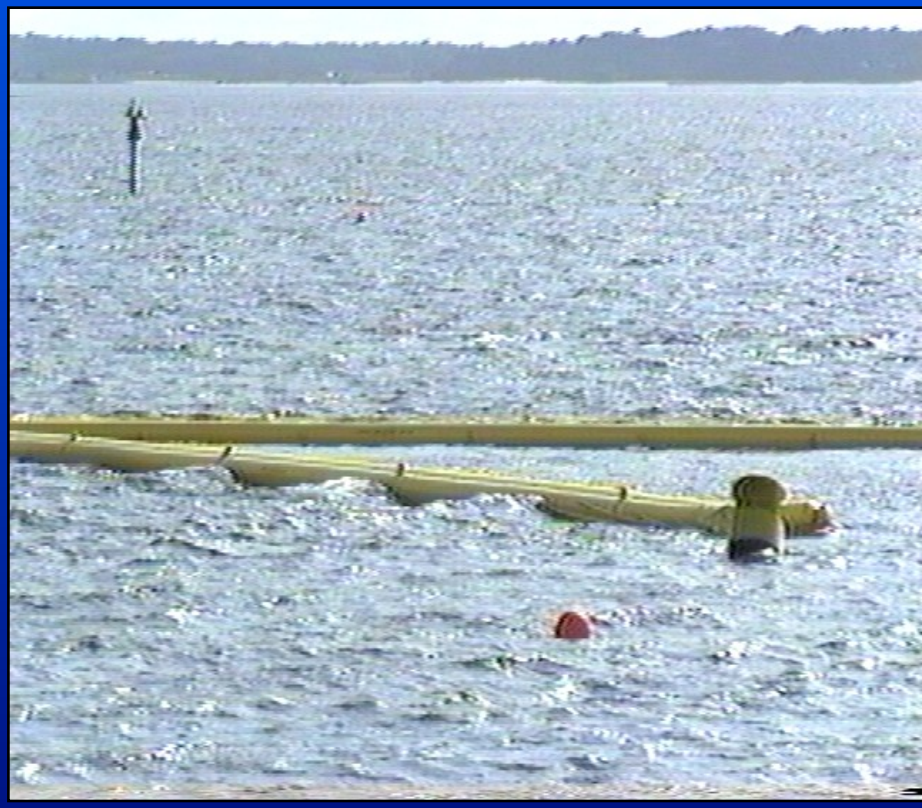
FY 2000 - FIELD STUDY

- PENSACOLA BAY
  - END OF MAY/START OF JUNE LAUNCH DATE
  - 4-6 WEEKS DURATION
- 1:4 SCALE
- IPT MEETING ON SITE
- HYDRO-BEAM
  - ONE LEG SINGLE SECTION
  - ONE LEG MULTI-SECTION
- EVALUATE SURVIVAL, OPERATIONAL, & MOORING ALTERNATIVES

RIBS XM 2000


FREEBOARD
FLOTATION
2 FT
6-7.5 FT
DIAMETER
LOW PSI
SEAWATER
HIGH
STRENGTH
STRAP FOR
STIFFNESS
(SPECTRA)
URETHANE

Field Tests At Pensacola, FL
“Soft” RIBS - 1997 1: 4 Scale



HYDROBEAM RIBS

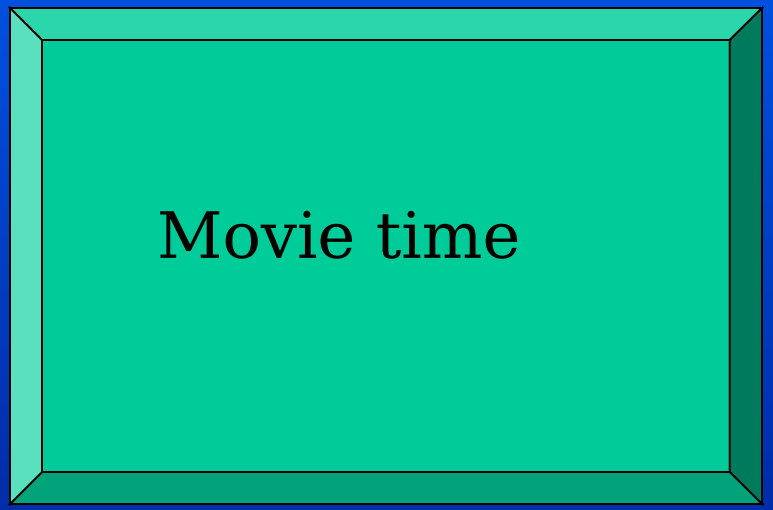
- UNDER DEVELOPMENT
  - POINTS OF ATTACHMENTS FOR MOORING LINES
  - VESSEL/RIB MOORING STRATEGY
  - JOINTS OR MODULE CONNECTIONS

Model Demo

1:16 Scale

New Joint

Stiffness Elements


Movie time

Just joking

Work Shop - Jan 2000
No Show Stoppers - 2 alternatives
Short Scope, Conventional

Mooring

Fabrication

Operational

Work Shop - Dec 99 No Show Stoppers

Work Shop - Jan 2000
3 RIB/Ship Configurations

Captain Kidd, LMSR Fisher

ATD RIB

Hurricane Mooring Syste

Advanced Marine technologies

- **The Helical Anchor**

A versatile, mechanically deep set anchor offering massive and certifiable holding power with zero drag.

- **Seaflex**

A reinforced, energy absorbing elastometric cord with unprecedented and reliable shock attenuating capability.

- **Spectron**

A high strength polymer that is, pound for pound, ten times stronger than steel. It backs up the Seaflex to complete a resilient, powerful link.

PLANS BEYOND FY 2000

MOORING SYSTEM DEVELOPMENT

- FY 01 FULL SCALE TESTS
  - HALF LENGTH AT OCEAN SCALE (500 FT)
  - MOORING SYSTEM(S)

FY 02 FULL SCALE ATD DEPLOYMENT

- ATD EXIT CRITERIA VALIDATION
  - OPERATIONAL
  - FUNCTIONAL
  - SURVIVABILITY OPTIONS
- WITH SCHEDULED EXERCISE
- FULL LENGTH AT OCEAN SCALE

FY 03 TRANSITION TO PROCUREMENT

Program Status

- ORD & STRAP
  - Approved 17 Jan 2000
- RIB XM-99
  - Successful deployment
  - Performance objectives met
  - Good agreement with predicted values
  - Primary lesson learned
    - Flexible/fabric RIB offers significant advantages over “hard” structure

Program Status
(concluded)

- FY 2000 Milestones Are On Target
  - ✓ Mooring
  - ✓ Operational
  - ✓ Design and Testing